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XIII. *An Account of a Thunder-storm in Scotland; with some Meteorological Observations. In a Letter from Patrick Brydone, Esq. F. R. S. to Sir Joseph Banks, Bart. P. R. S.*

Read January 18, 1787.

DEAR SIR,

Lennel-House, near Coldstream, Dec. 20, 1786.

I NOW fit down to give you some account of the thunder-storm, which I remember to have mentioned to you in conversation, and of which you wished to be more particularly informed. I do not know whether you will think it worthy of the attention of the Society; but you will be pleased to make whatever use of it you think proper. It is copied, with some additions, from the journal which I usually keep in the country, and which was wrote down immediately after the event.

Tuesday, the 19th of July, 1785, was a fine soft morning (thermometer, at ten, 68°); about eleven, clouds began to form in the south-east; and between twelve and one there were several flashes of lightning, followed by rolling claps of thunder, at a considerable distance. I was sitting in my study at an open window, in the second story, observing the progress of the storm; when some ladies, who were in the drawing-room below, alarmed by the lightning, came up to me. I was making them observe, by a stop-watch, the time which the sound took to reach us (which was generally from 25 to 30 seconds), and
assuring

assuring them the storm was at so great a distance, that there could be no sort of danger; when we were suddenly alarmed by a loud report, for which we were not prepared by any preceding flash: it resembled the firing of several muskets, so close together, that the ear could hardly separate the sounds; and was followed by no rumbling noise like the other claps.

The clouds immediately began to dissipate, and there were no more appearance of either thunder or lightning. I had ordered my horses to be got ready, and was just going to mount, when a servant came running in to tell me, that a man and two horses had been struck dead by the thunder, at a small distance from the house. I immediately set out, and arrived on the spot in less than half an hour after the accident. The horses were still yoked to the cart, and lying in the same position in which they had been struck down; but the body of the young man had been already carried off by his companion, who soon returned to the place; and, with less agitation than I expected, described to me how every thing had passed.

They were both servants to Mr. TURNBULL, a tenant of the Earl of HOME, and were returning home with two carts loaded with coals. JAMES LAUDER, a strong young man, of twenty-four years of age, had the charge of the first cart, and was sitting on the fore-part of it. They had crossed the Tweed a few minutes before, at a deep ford, and had almost gained the highest part of an ascent, about 65 or 70 feet above the bed of the river. They were conversing about the thunder, which they heard at a distance, and expressing a wish that it might be accompanied by a fall of rain, as the only means of saving the crop, after so long and so severe drought. At that instant he was stunned by a loud report, and saw his companion, his horses and cart, fall to the ground. He immediately

ran to his assistance, but found him quite dead. His face, he said, was of a livid colour, his cloaths were torn to pieces, and he had a strong smell of burning. He immediately emptied his own cart, and carried home LAUDER's body to his friends; so that I had not an opportunity of examining it: but Mr. BELL, Minister of Coldstream, a gentleman of the most perfect candour and veracity, told me, that he had been sent for, to announce the fatal event to the young man's parents, and had examined the body; that he found the skin of the right thigh much burnt and shrivelled, and many marks of the same kind over the whole body; but none on the legs, which he imputed to their hanging over the fore-part of the cart at the time of the explosion, and not being in contact with any part of it. His cloaths, and particularly his shirt, was very much torn, and emitted a strong smell of burning. The body was buried two days after, without having discovered any symptoms of putrefaction.

LAUDER's companion shewed me the distance between the two carts, which was exactly marked; for his horses had turned round at the time of the explosion, and broke their harness: I found it about twenty-four yards, and LAUDER's cart was a few feet higher on the bank, but had not yet reached the summit. He told me, he was likewise sitting on the fore-part of his cart, and had LAUDER, his cart and horses, full in view, when they fell to the ground; that he perceived no flash, nor appearance of fire, and was sensible of no shock, nor uncommon sensation.

I now examined the cart, and the spot around it, as exactly as I could. The horses were black, and of a strong make; they had fallen on the left side, and their legs had made a deep impression in the dust, which, on our lifting them up, shewed

shewed the exact form of each leg ; so that no kind of struggle or convulsive motion had succeeded the fall, but every principle of life seems to have been extinguished in an instant. The hair was much singed over the greatest part of their bodies ; but was most perceptible on the belly and legs. Their eyes were already become dull and opake, and looked like the eyes of an animal which had been long dead. The joints were all supple ; and I could not perceive that any of the bones were either softened or dissolved, as it has been alledged sometimes happens to animals killed by lightning. The left shaft of the cart was broken ; and I observed, that splinters had been thrown off in many places, particularly where the timber of the cart was connected by nails, or cramps of iron. Many pieces of the coal were likewise thrown out to a considerable distance, all round the cart ; and some of them, which I have preserved, have the appearance of coal which had lain some time on a fire. I likewise gathered up the fragments of LAUDER's hat, which had been torn to innumerable small pieces ; some of which I shall inclose for your inspection, as well as part of his hair, which I found strongly united to some of the fragments which had composed the crown of the hat *. About four feet and a half behind each wheel of the cart, I observed an odd appearance in the ground ; a circular hole of about twenty inches in diameter, the center of which was exactly in the tract of each wheel. The earth was torn up, as if by violent blows of a pick-axe, and the small stones and dust were scattered on each side of the road. The tracks of the wheels were strongly marked in the dust, both behind and before these holes, but were completely obliterated for upwards of a foot and a half on these spots. This led me to suspect, that the force which had formed them must likewise have

* These were exhibited to the Society. C. B.

acted strongly upon the wheels; and, on examination, I found evident marks of fusion on each of them, which I now shewed to many people who had assembled around us. The surface of the iron, to the length of about three inches, and the whole breadth of the wheel, had become of a bluish colour, had entirely lost its polish and smoothness, and had the appearance of drops incompletely formed on its surface; these were of a roundish form, and had a sensible projection. I suspected that the great heat, which had been communicated to the iron, might probably have burnt the wood of the wheels; but this I did not find to be the case. To ascertain whether these marks were occasioned by the explosion which had torn up the ground, we pushed back the cart on the same tracks which it had described on the road; and found, that the marks of fusion answered exactly to the center of each of the holes; and that, at the instant of the explosion, the iron of the wheels had been sunk deep in the dust. They had made almost half a revolution after the explosion, which might be occasioned by the falling down of the horses, which pulled the cart a little forward. On examining the opposite part of the wheels, or that part which was at the greatest distance from the earth, no mark of any kind was observable. The broken earth still emitted a smell something like that of ether. The ground was remarkably dry, and of a gravelly soil.

It would appear, that this great explosion had, in an instant, pervaded every substance connected with the cart, the wheels of which had probably conducted it from the ground. They had been completely wetted but a few minutes before, as well as the legs and bellies of the horses, and this might, perhaps, be the reason why the hair on these parts was much more burnt than on the rest of their bodies. However, the two horses

had already walked over this electrical mine, without having produced any effect; and had not the cart followed them might have escaped without hurt. I examined all their shoes, but could not perceive the least mark on any of them, nor was the earth broken where they had trodden. But the cart was deeply laden, and the wheels had penetrated much farther into the ground.

The equilibrium between the earth and the atmosphere seems at this instant to have been completely restored; for no farther appearance of thunder or lightning was observed within our hemisphere; the clouds dispelled, and the air resumed the most perfect tranquillity: but how this vast quantity of electric matter could be discharged from the one element into the other without exhibiting any appearance of fire, I shall not pretend to examine. The fact, however, appears certain; and when I was mentioning it as a singular one, a gentleman told me, that the shepherd of St. Cuthbert's farm, on the opposite bank of the Tweed, had been an eye-witness of the event, and gave a different account of it. I immediately went to the farm, found the shepherd, and made him conduct me to the spot from whence he had observed it, and desired him to give me an account of what had happened. He was looking, he said, at the two carts going up the bank, when he was stunned by a loud report, and at the same instant saw the first of the carts fall to the ground, and observed that the man and horses lay still, as if dead. I asked him, if he had observed any lightning? He said, he saw no lightning, nor appearance of fire whatever; but observed the dust to rise at the place; that there had been several flashes of lightning some time before from the south-east, whereas the accident happened to the north-west of where he stood. The distance, in a right line
across

across the river, might be between two and three hundred yards. He was sensible of no shock, nor uncommon sensation of any kind. I went next morning to examine if there were any marks of putrefaction on the horses, and to observe the state of the blood-vessels, &c. after the skin had been taken off; but a gentleman of the neighbourhood, who kept a pack of hounds, had already seized on them.

Several other phænomena happened on that day, probably all proceeding from the same cause; some of which I shall beg leave to mention.

The shepherd, belonging to the farm of Lennel-Hill, was in a neighbouring field, tending his flock, when he observed a lamb drop down; and said, he felt at the same time as if fire had passed over his face (this was his own expression), although the lightning and claps of thunder were then at a great distance from him. He ran up immediately, but found the lamb quite dead; nor did he perceive the least convulsive motion, nor symptom of life remaining, although the moment before it appeared to be in perfect health. He bled it with his knife, and the blood flowed freely. This, he told me, happened about a quarter of an hour before the explosion which killed LAUDER; and it was not above three hundred yards distant from the spot. He was only a few yards from the lamb when it fell down. The earth was not torn up, nor did he observe any dust rise.

THOMAS FOSTER, a celebrated fisher in Coldstream, and another man, were standing in the middle of the Tweed, fishing for salmon with the rod, when they suddenly heard a loud noise; and, turning round to see from whence it came, they found themselves caught in a violent whirlwind, which FOSTER told me felt sultry and hot, and almost prevented

them from breathing. It was not without much difficulty they could reach the bank, where they sat down, exhausted with fatigue, and greatly alarmed: however it lasted but a very short time, and was succeeded by a perfect calm. This happened about an hour before the explosion.

A woman, making hay near the banks of the river, fell suddenly to the ground, and called out to her companions, that she had received a violent blow on the foot, and could not imagine from whence it came. This I had not from the woman herself, but from Mr. TURNBULL, a very respectable farmer. Mr. BELL, our minister, nephew of THOMSON the Poet, and possessed of all the candour and ingenuity of his uncle, told me, that, walking in his garden, a little before LAUDER's accident, he several times felt a sensible tremor in the ground. He likewise told me (what I find I had forgot to mention in the proper place), that he had observed on LAUDER's body a zig-zag line, of about an inch and a quarter broad, which extended from his chin down to his right thigh, and had followed nearly the line of the buttons of his waistcoat. The skin was burnt white and hard.

These, sir, are all the circumstances I have been able to collect that are well authenticated; and I shall not trouble you with reports that are not. From the whole it would appear, that the earth had acquired a great super-abundance of electrical matter, which was every where endeavouring to fly off into the atmosphere. Perhaps it might be accounted for from the excessive dryness of the ground; and, for many months, the almost total want of rain, which is probably the agent that Nature employs in preserving, or in restoring, the equilibrium between the other two elements. But I shall not pretend to investigate the causes: all I wanted, was to give you some
account

account of the effects; and your own reflections will lead you much farther than any thing I could suggest.

I have the honour to be, with the greatest respect, &c.

P. BRYDONE.

P. S. I cannot fend away this letter without adding, in a Post-script, that on Friday the 11th of August last, early in the morning, we had a pretty smart shock of an earthquake. I was awaked by it, and felt the motion most distinctly for four or five seconds at least. It appeared as if the bed had been pulled gently from side to side several times. The motion was nearly north north-west and south-east, as far as I could judge from the motion of the bed. The windows were violently shaken, and made a great noise, which, I believe, was mistaken by many people for a noise accompanying the earthquake. I immediately rose to look at my watch, and found it twenty minutes after two. It was a dead calm, the morning close and warm, with small drizzling rain, and, although the moon was but two days past the full, so dark that I could not perceive the hour without striking a light. It was felt in almost every house in this neighbourhood, and all the way from this country to the west coast of the island, where it seems to have been more violent than here; but to the east of this place it was very little felt.

Perhaps it may not be improper to mention the state of the weather for some time before and after this event, as it may possibly have had some influence upon it. The drought was very great till the 22d of July, when it rained a little; and this was repeated, though in small quantities, and generally accompanied by high winds, till Thursday the 27th, when it
blew

blew the most violent tempest I ever remember in this country. The young crop of turneps, in many fields, were blown out of the ground, and almost entirely destroyed. The pease became brown as if withered, and so did the leaves of the forest trees on that side which was opposed to the blast. Vast clouds of dust were raised from the dry fields and roads, which looked like smoke, and had the appearance at a distance as if many villages had been on fire all over the country. The water too was raised from the surface of the river, and carried quite away by the violence of the hurricane, forming small clouds in the air, which we traced to a great distance. The great violence of this tempest lasted but a few hours, and at night it fell calm. The barometer was little affected, and stood at 29 inches and a half. The wind was nearly west, veering sometimes a little to the north. From this time we had a tract of very fine weather, the wind constantly in the west points, till the time of the earthquake (which happened on what is called the last of the dog days), when it changed to the south-east, and brought us five of the worst days I ever remember to have seen at that season; it rained almost incessantly, with a cold easterly wind, and the sun did not once appear till the morning of Wednesday the 16th, after which we had again a tract of fine weather. I examined the barometer at the time of the earthquake, but did not find that it had been sensibly affected. It rose a little on that morning; but this I imputed to the wind having changed into the east.

